MULTIMEDIA UNIVERSITY

STUDENT ID NO

SEAT NO

VENUE: _____

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

PMT0301 – MATHEMATICS III

(All sections/ Groups)

20 OCTOBER 2016
9.00 a.m. – 11.00 a.m.
(2 Hours)

Question	Marks
1	/10
2	/10
3	/10
4	/10
5	/10
Total	/50

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **ELEVEN** printed pages excluding cover page, formulae list and statistical table.

2. Answer **ALL** FIVE questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the **QUESTION BOOKLET**. All necessary working steps **MUST** be shown.

Question 1

a) Find an equation of the plane which passes through the origin and contains the line $x = 2 + 3t$, $y = 1 - 4t$ and $z = 6 - t$. (4 marks)

b) Find the vector equations of the line passing through the point $(-2, 7, 3)$ that is perpendicular to $x - 5y + 4z = 21$. (2 marks)

Continued...

c) Siti gets a job with a salary of RM42, 000 a year. She is promised a RM3, 000 increment each subsequent year. Find her total salary for a 25-year period. (2 marks)

d) Use the Binomial Theorem to expand $(x-2y)^4$. (2 marks)

Question 2

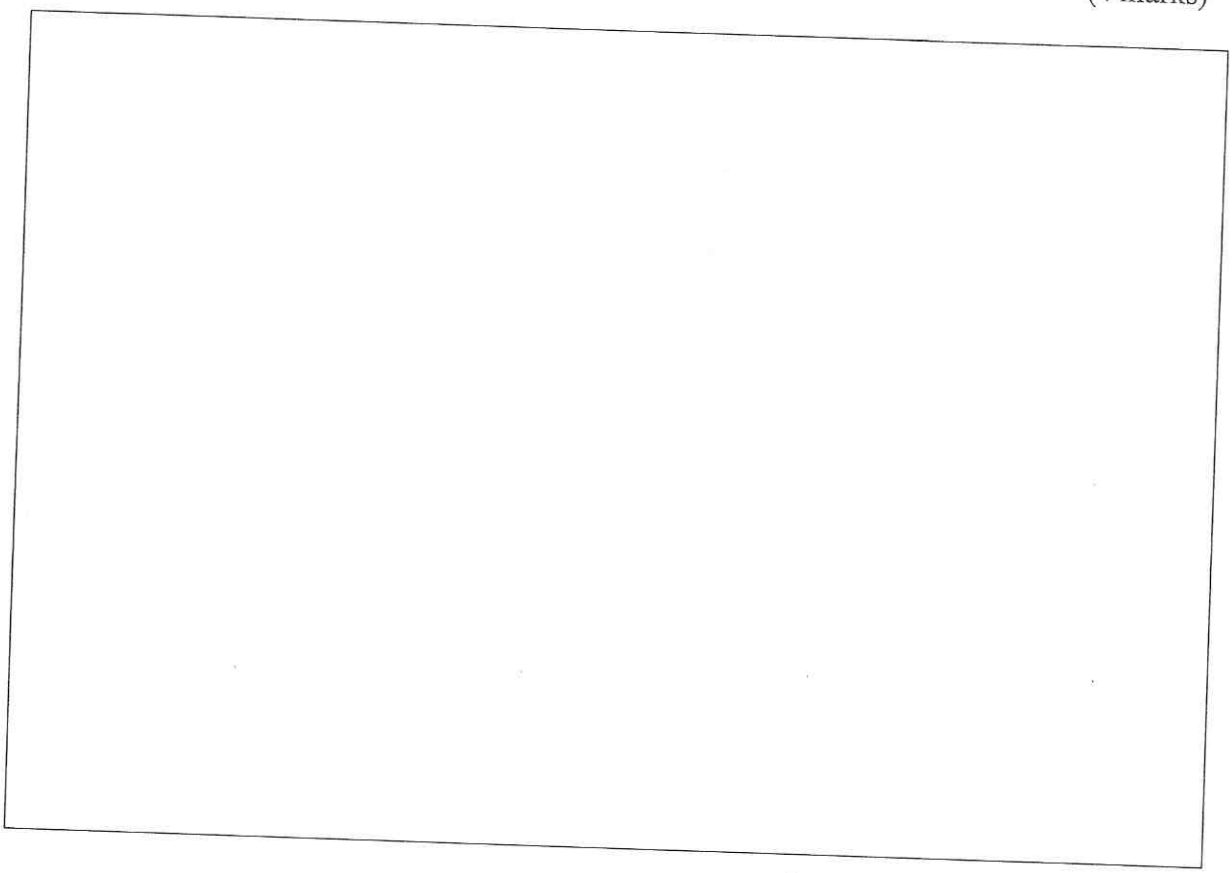
a) Solve the system of linear equations by using inverse method. (6 marks)

$$2x - y + z = 11$$
$$x + 2z = 8$$
$$x + 2y - 3z = -15$$

Continued...

b) The height of Malaysians is normally distributed with a mean of $165cm$ and a variance of $25cm$. What is the probability that a randomly selected Malaysian will have a height between $152cm$ and $168\ cm$?

(4 marks)



Question 3

The following table shows the housing allowance of 30 staffs in a company.

Money (in RM)	Number of staffs
101 – 200	5
201 – 300	8
301 – 400	10
401 – 500	5
501 – 600	2
TOTAL	**30**

a) Compute the midpoint, class boundaries, $\sum mf$ and $\sum m^2 f$. (2 marks)

Class Limit	f	Midpoint, m	Class boundaries	mf	$m^2 f$
101 – 200	5				
201 – 300	8				
301 – 400	10				
401 – 500	5				
501 – 600	2				
TOTAL	**30**			$\sum mf =$	$\sum m^2 f =$

b) Calculate the mean. Give your answer correct to 2 decimal places. (2 marks)

Continued...

c) Calculate the median. Give your answer correct to 2 decimal places. (2 marks)

d) Calculate the mode. Give your answer correct to 2 decimal places. (2 marks)

e) Calculate the standard deviation. Give your answer correct to 2 decimal places.
(2 marks)

Continued…

Question 4

a) In how many ways can three different balls and three different cones be arranged alternately in a row?
(1 mark)

b) A student has to answer 10 out of 15 questions in a Mathematics Competency Test. How many choices the student has if he/she must answer the first or second questions but not both?
(2 marks)

c) The events A and B are such that $P(A) = 0.625$, $P(A \cup B) = 0.90$ and $P(B|A) = 0.40$.

i) Find $P(B)$.
(3 marks)

ii) Find $P(A|B)$. (2 marks)

iii) Prove that A and B are dependent. (2 marks)

Continued…

Question 5

a) According to a survey by *ABC* magazine, approximately 60% of the internet subscribers in a region surf net for online movies. Find the probability that among the next 10 subscribers from this region, at least 2 users subscribing internet not because of surfing for online movies. Give your answer correct to 4 decimal places. (3 marks)

b) In a 15-question multiple choices test, each question has 4 choices and only one is correct. What is the probability of answering 3 questions correctly just by guessing? Give your answer correct to 4 decimal places. (2 marks)

Continued...

c) A document containing 160 pages has 200 errors. Find the probability that on page 102 and 103 will contain exactly three errors. Give your answer correct to 4 decimal places.
(2 marks)

d) The number of small bubbles formed in a glass panel has a Poisson distribution with an average of three small bubbles for an area of $8\,m^2$. Find the probability that two pieces of the glass panels with each $2.5m \times 2.0m$, will contain more than one small bubbles.
(3 marks)

End of Page

FORMULAE LIST

Vector

Dot Product:

$$\mathbf{u}\cdot\mathbf{v} = u_1v_1 + u_2v_2 + u_3v_3 \quad \text{or} \quad \mathbf{u}\cdot\mathbf{v} = \|\mathbf{u}\|\|\mathbf{v}\|\cos\theta$$

Cross Product:

$$\mathbf{u}\times\mathbf{v} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ u_1 & u_2 & u_3 \\ v_1 & v_2 & v_3 \end{vmatrix} = \begin{vmatrix} u_2 & u_3 \\ v_2 & v_3 \end{vmatrix}\mathbf{i} - \begin{vmatrix} u_1 & u_3 \\ v_1 & v_3 \end{vmatrix}\mathbf{j} + \begin{vmatrix} u_1 & u_2 \\ v_1 & v_2 \end{vmatrix}\mathbf{k}$$

Line Equation in 3D space:

$$\mathbf{r} = \mathbf{r}_0 + t\mathbf{v}$$

Plane Equation in 3D space:

$$\mathbf{n}.(\mathbf{r} - \mathbf{r}_0) = 0$$

Mode

$$L + \left[\frac{f_m - f_B}{(f_m - f_A) + (f_m - f_B)}\right]c$$

Median

$$L + \left(\frac{\frac{\sum f}{2} - f_L}{f_m}\right)c$$

Mean

Ungrouped Data		Grouped Data	
Sample	**Population**	**Sample**	**Population**
$\bar{x} = \dfrac{\sum x}{n}$	$\mu = \dfrac{\sum x}{N}$	$\bar{x} = \dfrac{\sum mf}{\sum f}$	$\mu = \dfrac{\sum mf}{\sum f}$

Variance

Ungrouped Data	
Sample	**Population**
$s^2 = \dfrac{\sum x^2 - \dfrac{\left(\sum x\right)^2}{n}}{n-1}$	$\sigma^2 = \dfrac{\sum x^2 - \dfrac{\left(\sum x\right)^2}{N}}{N}$
Grouped Data	
Sample	**Population**
$s^2 = \dfrac{\sum m^2 f - \dfrac{\left(\sum mf\right)^2}{\sum f}}{\sum f - 1}$	$s^2 = \dfrac{\sum m^2 f - \dfrac{\left(\sum mf\right)^2}{\sum f}}{\sum f}$

Conditional Probability

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

Independent Event

$$P(A|B) = P(A) \text{ or } P(B|A) = P(B) \text{ or } P(A \cap B) = P(A)\cdot P(B)$$

Binomial

$$P(X = x) = \binom{n}{x} p^x q^{n-x} \quad ; \quad \mu = np \quad ; \quad \sigma = \sqrt{npq}$$

Poisson

$$P(X = x) = \frac{\lambda^x e^{-\lambda}}{x!} \quad ; \quad \mu = \lambda \quad ; \quad \sigma = \sqrt{\lambda}$$

Standard Normal

$$z = \frac{x - \mu}{\sigma}$$

Standard Normal Distribution

$$p(z \le z_1) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z_1} e^{-\frac{1}{2}z^2} dz$$

The Normal Distribution Function

x	Φ(X)	x	Φ(X)	x	Φ(X)	x	Φ(X)
0.00	0.5000	0.50	0.6915	1.00	0.8413	1.50	0.9332
0.01	0.5040	0.51	0.6950	1.01	0.8438	1.51	0.9345
0.02	0.5080	0.52	0.6985	1.02	0.8461	1.52	0.9357
0.03	0.5120	0.53	0.7019	1.03	0.8485	1.53	0.9370
0.04	0.5160	0.54	0.7054	1.04	0.8508	1.54	0.9382
0.05	0.5199	0.55	0.7088	1.05	0.8531	1.55	0.9394
0.06	0.5239	0.56	0.7123	1.06	0.8554	1.56	0.9406
0.07	0.5279	0.57	0.7157	1.07	0.8577	1.57	0.9418
0.08	0.5319	0.58	0.7190	1.08	0.8599	1.58	0.9429
0.09	0.5359	0.59	0.7224	1.09	0.8621	1.59	0.9441
0.10	0.5398	0.60	0.7257	1.10	0.8643	1.60	0.9452
0.11	0.5438	0.61	0.7291	1.11	0.8665	1.61	0.9463
0.12	0.5478	0.62	0.7324	1.12	0.8686	1.62	0.9474
0.13	0.5517	0.63	0.7357	1.13	0.8708	1.63	0.9484
0.14	0.5557	0.64	0.7389	1.14	0.8729	1.64	0.9495
0.15	0.5596	0.65	0.7422	1.15	0.8749	1.65	0.9505
0.16	0.5636	0.66	0.7454	1.16	0.8770	1.66	0.9515
0.17	0.5675	0.67	0.7486	1.17	0.8790	1.67	0.9525
0.18	0.5714	0.68	0.7517	1.18	0.8810	1.68	0.9535
0.19	0.5753	0.69	0.7549	1.19	0.8830	1.69	0.9545
0.20	0.5793	0.70	0.7580	1.20	0.8849	1.70	0.9554
0.21	0.5832	0.71	0.7611	1.21	0.8869	1.71	0.9564
0.22	0.5871	0.72	0.7642	1.22	0.8888	1.72	0.9573
0.23	0.5910	0.73	0.7673	1.23	0.8907	1.73	0.9582
0.24	0.5948	0.74	0.7704	1.24	0.8925	1.74	0.9591
0.25	0.5987	0.75	0.7734	1.25	0.8944	1.75	0.9599
0.26	0.6026	0.76	0.7764	1.26	0.8962	1.76	0.9608
0.27	0.6064	0.77	0.7794	1.27	0.8980	1.77	0.9616
0.28	0.6103	0.78	0.7823	1.28	0.8997	1.78	0.9625
0.29	0.6141	0.79	0.7852	1.29	0.9015	1.79	0.9633
0.30	0.6179	0.80	0.7881	1.30	0.9032	1.80	0.9641
0.31	0.6217	0.81	0.7910	1.31	0.9049	1.81	0.9649
0.32	0.6255	0.82	0.7939	1.32	0.9066	1.82	0.9656
0.33	0.6293	0.83	0.7967	1.33	0.9082	1.83	0.9664
0.34	0.6331	0.84	0.7995	1.34	0.9099	1.84	0.9671
0.35	0.6368	0.85	0.8023	1.35	0.9115	1.85	0.9678
0.36	0.6406	0.86	0.8051	1.36	0.9131	1.86	0.9686
0.37	0.6443	0.87	0.8078	1.37	0.9147	1.87	0.9693
0.38	0.6480	0.88	0.8106	1.38	0.9162	1.88	0.9699
0.39	0.6517	0.89	0.8133	1.39	0.9177	1.89	0.9706
0.40	0.6554	0.90	0.8159	1.40	0.9192	1.90	0.9713
0.41	0.6591	0.91	0.8186	1.41	0.9207	1.91	0.9719
0.42	0.6628	0.92	0.8212	1.42	0.9222	1.92	0.9726
0.43	0.6664	0.93	0.8238	1.43	0.9236	1.93	0.9732
0.44	0.6700	0.94	0.8264	1.44	0.9251	1.94	0.9738
0.45	0.6736	0.95	0.8289	1.45	0.9265	1.95	0.9744
0.46	0.6772	0.96	0.8315	1.46	0.9279	1.96	0.9750
0.47	0.6808	0.97	0.8340	1.47	0.9292	1.97	0.9756
0.48	0.6844	0.98	0.8365	1.48	0.9306	1.98	0.9761
0.49	0.6879	0.99	0.8389	1.49	0.9319	1.99	0.9767
0.50	0.6915	1.00	0.8413	1.50	0.9332	2.00	0.9772

x	Φ(X)	x	Φ(X)	x	Φ(X)	x	Φ(X)
2.00	0.97725	2.50	0.99379	3.00	0.99865	3.50	0.99977
2.01	0.97778	2.51	0.99396	3.01	0.99869	3.51	0.99978
2.02	0.97831	2.52	0.99413	3.02	0.99874	3.52	0.99978
2.03	0.97882	2.53	0.99430	3.03	0.99878	3.53	0.99979
2.04	0.97932	2.54	0.99446	3.04	0.99882	3.54	0.99980
2.05	0.97982	2.55	0.99461	3.05	0.99886	3.55	0.99981
2.06	0.98030	2.56	0.99477	3.06	0.99889	3.56	0.99981
2.07	0.98077	2.57	0.99492	3.07	0.99893	3.57	0.99982
2.08	0.98124	2.58	0.99506	3.08	0.99896	3.58	0.99983
2.09	0.98169	2.59	0.99520	3.09	0.99900	3.59	0.99983
2.10	0.98214	2.60	0.99534	3.10	0.99903	3.60	0.99984
2.11	0.98257	2.61	0.99547	3.11	0.99906	3.61	0.99985
2.12	0.98300	2.62	0.99560	3.12	0.99910	3.62	0.99985
2.13	0.98341	2.63	0.99573	3.13	0.99913	3.63	0.99986
2.14	0.98382	2.64	0.99585	3.14	0.99916	3.64	0.99986
2.15	0.98422	2.65	0.99598	3.15	0.99918	3.65	0.99987
2.16	0.98461	2.66	0.99609	3.16	0.99921	3.66	0.99987
2.17	0.98500	2.67	0.99621	3.17	0.99924	3.67	0.99988
2.18	0.98537	2.68	0.99632	3.18	0.99926	3.68	0.99988
2.19	0.98574	2.69	0.99643	3.19	0.99929	3.69	0.99989
2.20	0.98610	2.70	0.99653	3.20	0.99931	3.70	0.99989
2.21	0.98645	2.71	0.99664	3.21	0.99934	3.71	0.99990
2.22	0.98679	2.72	0.99674	3.22	0.99936	3.72	0.99990
2.23	0.98713	2.73	0.99683	3.23	0.99938	3.73	0.99990
2.24	0.98745	2.74	0.99693	3.24	0.99940	3.74	0.99991
2.25	0.98778	2.75	0.99702	3.25	0.99942	3.75	0.99991
2.26	0.98809	2.76	0.99711	3.26	0.99944	3.76	0.99992
2.27	0.98840	2.77	0.99720	3.27	0.99946	3.77	0.99992
2.28	0.98870	2.78	0.99728	3.28	0.99948	3.78	0.99992
2.29	0.98899	2.79	0.99736	3.29	0.99950	3.79	0.99992
2.30	0.98928	2.80	0.99744	3.30	0.99952	3.80	0.99993
2.31	0.98956	2.81	0.99752	3.31	0.99953	3.81	0.99993
2.32	0.98983	2.82	0.99760	3.32	0.99955	3.82	0.99993
2.33	0.99010	2.83	0.99767	3.33	0.99957	3.83	0.99994
2.34	0.99036	2.84	0.99774	3.34	0.99958	3.84	0.99994
2.35	0.99061	2.85	0.99781	3.35	0.99960	3.85	0.99994
2.36	0.99086	2.86	0.99788	3.36	0.99961	3.86	0.99994
2.37	0.99111	2.87	0.99795	3.37	0.99962	3.87	0.99995
2.38	0.99134	2.88	0.99801	3.38	0.99964	3.88	0.99995
2.39	0.99158	2.89	0.99807	3.39	0.99965	3.89	0.99995
2.40	0.99180	2.90	0.99813	3.40	0.99966	3.90	0.99995
2.41	0.99202	2.91	0.99819	3.41	0.99968	3.91	0.99995
2.42	0.99224	2.92	0.99825	3.42	0.99969	3.92	0.99996
2.43	0.99245	2.93	0.99831	3.43	0.99970	3.93	0.99996
2.44	0.99266	2.94	0.99836	3.44	0.99971	3.94	0.99996
2.45	0.99286	2.95	0.99841	3.45	0.99972	3.95	0.99996
2.46	0.99305	2.96	0.99846	3.46	0.99973	3.96	0.99996
2.47	0.99324	2.97	0.99851	3.47	0.99974	3.97	0.99996
2.48	0.99343	2.98	0.99856	3.48	0.99975	3.98	0.99997
2.49	0.99361	2.99	0.99861	3.49	0.99976	3.99	0.99997
2.50	0.99379	3.00	0.99865	3.50	0.99977	4.00	0.99997